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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/669,624

09/24/2003

John F. Wakerly

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BAKER BOTTS L.L.P.

2001 ROSS AVENUE

SUITE 600

DALLAS, TX 75201-2980

EXAMINER

AVELLINO, JOSEPH E

ART UNIT

PAPER NUMBER

2143

NOTIFICATION DATE

DELIVERY MODE

03/28/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptomail1@bakerbotts.com

glenda.orrantia@bakerbotts.com

Office Action Summary	Application No. 10/669,624	Applicant(s) WAKERLY, JOHN F.	
	Examiner Joseph E. Avellino	Art Unit 2143	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/24/03</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

1. Claims 1-47 are presented for examination; claims 1, 20, 29, 38, and 47 independent.

Information Disclosure Statement

2. The IDS dated September 24, 2003 has been considered. See enclosed PTO-1449.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 20-28, and 38-46 are rejected under 35 U.S.C. 101 because they fail to establish a statutory category of invention.

Exemplary claim 20 claims a "context manager" which can be implemented solely as software (see specification, page 21). As such, it can be reasonably construed that the context manager as claimed only recites software elements and therefore is merely a software program. As such, software, per se fails to establish a statutory category of invention. Correction is required.

Exemplary claim 38 claims only "Logic", which is software, per se. As such, software, per se fails to establish a statutory category of invention. Correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6, 9-11, 13-25, 27, 29-33, 35, 37-42, 44, 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Melvin et al. (US 2003/0069920) (hereinafter Melvin) in view of Johnson et al. (USPN 6,684,395) (hereinafter Johnson).

5. Referring to claim 1, Melvin discloses a system for packet processing, the system comprising:

a plurality of processors (i.e. tribes) each comprising a processor core and instruction memory loaded with a code partition (i.e. memory for processing threads), each of the memories implementing a feature set for packet processing, the processor core operable to execute the code partition to perform processing of packets and to generate migration requests for transferring packet processing operations from the loaded code partition (i.e. tribe to tribe migration of contexts to move threads, which execute packet processing, from tribe-to-tribe) (e.g. abstract; Figure 1);

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a context manager (i.e. arbiter) operable to receive a migration request from one of the loaded code partitions (i.e. tribe) executing within one of the processor cores, the migration request comprising packet context information (i.e. context register sets) and identifying a target one of the code partitions (i.e. code executing on a tribe), and in response to the migration request, to determine whether one of the processors having the target code partition loaded is available for processing and, if so, to communicate the packet context to the available one of the processors (i.e. selecting one requester for a non-busy destination, the system will only select the source if the request for migration was received) (§ 630-632).

Melvin does not disclose a shared memory maintaining a plurality of code partitions, which loads a code partition from the shared memory. In analogous art, Johnson discloses another system for network packet processing (col. 4, lines 1-12) which discloses a shared memory comprising a plurality of code partitions (i.e. threads) which can be loaded into various processor cores (i.e. microengines 14b-14g) (Figures 1 and 5; col. 3, lines 28-49; col. 8, lines 8-28). It would have been obvious to one of ordinary skill in the art to combine Johnson with Melvin by providing an efficient method to load the microcode as described in Johnson into the memory of the tribes of Melvin in order to provide an efficient method to install processing code into a particular processor, thereby reducing complexities with respect to program loading.

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6. Referring to claims 2 and 3, Melvin discloses placing migration data into a queue associated with a particular code partition (i.e. tribe) and upon determining that one of the processors having the target code partition loaded is available for processing, to communicate the packet context information to the to the available one of the processors (i.e. receive requests from all the different sources and put them into respective FIFOs) (§§ 569-574).

7. Claim 3 is rejected for similar reasons as stated above.

8. Referring to claim 4, Melvin discloses tracking an age for each entry in the queues and to service each of the queues based on the age for each of the entries (i.e. the scheduling function looks at the oldest request in the FIFO and schedules the request into the packet memory) (§ 583).

9. Referring to claim 5, Melvin-Johnson discloses the invention as described above. Melvin-Johnson does not expressly disclose the age identifies a time when a packet corresponding to the entry was received by the system, however this is well known in queuing systems. By this rationale, "Official Notice" is taken that both the concepts and advantages of tracking a time when a packet corresponding to reception by the system is well known and expected in the art. It would have been obvious to one of ordinary skill in the art to modify the system of Melvin-Johnson to include a timestamp to the packet in the FIFO in order to provide an efficient method to track each packet with respect to one another to

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ensure that oldest packets get out first, thereby ensuring proper throughput for the system.

10. Referring to claim 6, Melvin-Johnson discloses the invention as described in the claims above. Melvin-Johnson do not expressly disclose bypassing the queue when the queue is empty, however this is well known and expected in processing systems. By this rationale, "Official Notice" is taken that both the concepts and advantages of providing for queue bypass is well known and expected in the art. It would have been obvious to one of ordinary skill in the art to modify the system of Melvin-Johnson in order to reduce overhead processing by removing the added step queuing a packet only to dequeue the packet immediately, resulting in wasted clock cycles.

11. Referring to claim 9, the packet context information comprises a stack pointer that indicates a portion in the shared memory (i.e. migrating a thread from one tribe to another by moving the program counter and a portion of the context registers to registers of the second one of the tribes) (§ 8).

12. Referring to claim 10, Melvin-Johnson do not expressly disclose storing context data in a shared memory before issuing a migration request, however this is well known in the art as a feature of "process migration". By this rationale, "Official Notice" is taken that both the concepts and advantages of storing context data in a shared memory for access by another process is well known and

expected in the art. It would have been obvious to one of ordinary skill in the art to modify the system of Melvin-Johnson to include process migration context storage in shared memory in order to provide an efficient method to distribute context information to particular elements.

13. Referring to claim 11, Melvin-Johnson discloses a first interconnect coupling the shared memory and the processors (Johnson: Figure 1, ref. 42) and a second interconnect coupling the processors and the context manager providing a dedicated link for transferring at least a portion of the packet processing information between the partitions operating on the processors (Melvin: Figure 1: ref. 109).

14. Referring to claims 13-15, Melvin discloses identifying an entry point using a program-counter offset from the beginning of the targeted code partition using an index into a table entry (i.e. transfer a program counter to a particular tribe) (see rejection above).

15. Referring to claims 16 and 17 Melvin-Johnson discloses the invention as described above. Melvin-Johnson do not explicitly state that at least one of the code portions is not installed in memory, and the context manager is further operable to receive a request for a code partition not loaded, and then initiate loading the code partition into the instruction memory, however this is a well known part of multiprocessor coding (i.e. pages of instructions loaded into a

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microprocessor). Furthermore if the microcode code object 116 includes a plurality of images 120, that was in excess of the number of microengines 14, then the core processor would be required to swap out/in various images to execute particular parts of the program. By this rationale, "Official Notice" is taken that both the concepts and advantages of providing for a code partition not loaded into processor memory, and when referenced, would be loaded into a particular processor instruction memory. It would have been obvious to one of ordinary skill to modify the system of Melvin-Johnson to provide multiple pages not in memory and to load them in when called in order to provide flexibility in assembling microcode code objects, and not having them rigidly set in the number of pages allocated, resulting in a flexible length program set.

16. Referring to claim 18, Johnson discloses a page of instructions and load code partitions using a paging scheme (Figure 8).

17. Referring to claim 19, Melvin discloses executing a plurality of processing threads operable to separately perform processing of packets using a loaded one of the code partitions (i.e. memory blocks) (e.g. abstract).

18. Claims 20-25, 27, 29-33, 35, 37-42, 44, 46 and 47 are rejected for similar reasons as stated above.

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Claims 7, 8, 12, 26, 28, 34, 36, 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Melvin-Johnson as applied above in view of Alam (USPN 7,340,535).

19. Referring to claims 7 and 8, Melvin-Johnson discloses the invention as described above. Melvin-Johnson do not explicitly disclose an initial code partition identifies a plurality of processing functions, and includes a migration instruction associated with the processing function which indicates another one of the partitions, rather Melvin just discloses a thread migration instruction NEXT, not anything regarding how the thread knows which tribe to go to next (¶ 89-92). IN analogous art, Alam discloses another packet processing system which discloses a Packet Forwarding Engine Driver which learns about the packet functions needed for the particular flow, and generating a data structure to direct how the ingress and egress controllers are to handle the particular packets of the flow (cols. 6-8). It would have been obvious to one of ordinary skill in the art to combine the PFE driver details of Alam into the packet buffer module of Melvin, thereby allowing the packet buffer module to determine which tribes need to process the packets and which migration instructions need to be inserted into the threads, in order to realize the benefits described in Alam in the system of Melvin, specifically the ability to efficiently control routing of network data that provides efficient configuration of routing functionality and that optimizes the use of available resources (Alam: col. 2, lines 10-15).

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20. Referring to claim 12, Melvin-Johnson discloses the invention as described in the claims above. Melvin-Johnson does not disclose detecting unbalanced operation and reassign code partitions to rebalance delays. In analogous art, Alam discloses a plurality of virtual service engines which are reconfigurable and provide resources which can be reconfigured to meet the needs of the system (col. 4, lines 23-33). It would have been obvious to one of ordinary skill in the art to combine Alam with Melvin-Johnson in order efficiently control routing of network data that provides efficient configuration of routing functionality and that optimizes the use of available resources (Alam: col. 2, lines 10-15).

21. Claims 26, 28, 34, 36, 45 are rejected for similar reasons as stated above.

Conclusion

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph E. Avellino whose telephone number is (571) 272-3905. The examiner can normally be reached on Monday-Friday 7:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J. Flynn can be reached on (571) 272-1915. The

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fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Joseph E. Avellino/
Primary Examiner, Art Unit 2143